UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/743,528	03/29/2001	Ib Dybkjaer	07089.0010U1	4036

23859 7590 03/24/2004

NEEDLE & ROSENBERG, P.C.
SUITE 1000
999 PEACHTREE STREET
ATLANTA, GA 30309-3915

EXAMINER	
RIDLEY, BASIA ANNA	
ART UNIT	**PAPER NUMBER**
1764	

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/743,528	DYBKJAER ET AL.	
	Examiner	Art Unit	
	Basia Ridley	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 March 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 2* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 2* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *032901, 080403*, 100603.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to under 37 CFR 1.74 because it does not contain a brief description of the drawings. Applicant is reminded that the disclosure shall contain a brief description of all drawing figures in addition to a detailed description of all drawing figures. Applicant's attention is directed to cited USP 5,167,865, which shows an example of brief description of all drawing figures (C6/6-14) followed by a detailed description of all drawing figures. Also, applicant's attention is directed to 37 CFR 1.74, which states:

> "When there are drawings, there shall be a brief description of the several views of the drawings and the detailed description of the invention shall refer to the different views by specifying the numbers of the figures and to the different parts by use of reference letters or numerals (preferably the latter)."

Appropriate correction is required. No new matter shall be added.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dybjkær ("Tubular Reforming and Autothermal Reforming of Natural Gas - An Overview of Available Processes") in view of Igarashi et al. (USP 5,167,865).

Regarding claim 1-2, Dybjkær, in Fig. 13, discloses a process for preparation of hydrogen and carbon monoxide rich gas, the process comprising the steps:

- passing a process gas of hydrocarbon feedstock ("Natural Gas Feed") through a first reactor ("Prereformer") with steam reforming catalyst in a heat conducting relationship with a hot gas stream of flue gas (see Fig. 13; page 98, Section 4; and page 99, Section 5);
- passing effluent from the first reactor to a subsequent tubular reactor ("Primary Reformer") being provided with a steam reforming catalyst and being heated by burning of fuel, thereby obtaining a partially steam reformed gas effluent and the hot gas stream of flue gas (see Fig. 13, page 98, Section 4 and pages 88-89, Section 3.1);
- passing the effluent from the second reactor to an autothermal reformer ("Secondary Reformer"; see Fig. 13, pages 100-102, Section 6.1); and
- withdrawing from the autothermal reformer a hot gas stream of product gas rich in hydrogen and carbon monoxide (Fig. 13 and page 101, lines 18-20);
- wherein the steam reforming catalyst comprises nickel and/or noble metal (page 86, Section 2 and page 91, Section 3.2).

While Dybjkær discloses that the first and second reactors can comprise either a tubular reactor (page 97, section 3.6), heat exchange reactor (page 97-98, section 4) and/or a fixed bed reactor (page 99-100, section 5). Further, the reference discloses that it is desired to improve thermal conductivity and efficiency of reactors used in disclosed process (page 92, lines 15-33), but the reference does not disclose said reactors having a thin film of steam reforming catalyst supported on walls of the reactors.

Igarashi et al. teaches an improved process for making of hydrogen and carbon monoxide rich gas by steam reforming wherein the process is carried out in a reactor having a thin film of steam reforming catalyst supported on walls of the reactor

(abstract). The process offers improved thermal conductivity and compactness over packed bed reactors or stacked monolith reactors (column 1-2).

It would have been obvious to one having ordinary skill in the art at the time of the invention to replace the catalyst filled tubes or packed catalyst bed of the first and second reactors of Dybjkær with the reactor having a thin film of steam reforming catalyst supported on walls of the reactor, as taught by Igarashi et al., for the purpose of improving thermal conductivity and compactness of said reactor.

4. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rostrop-Nielsen et al. (USP 5,932,141) in view of Dybjkær ("Tubular Reforming and Autothermal Reforming of Natural Gas - An Overview of Available Processes").

Regarding claims 1-2, Rostrop-Nielsen et al., in Fig. 1-3, discloses a process for preparation of hydrogen and carbon monoxide rich gas, the process comprising the steps of passing a process gas of hydrocarbon feedstock through a first reactor with a thin film of steam reforming catalyst supported on walls of the reactor in a heat conducting relationship with a hot gas stream of flue gas; passing effluent from the first reactor to a subsequent tubular reactor being provided with a thin film of steam reforming catalyst and/or steam reforming catalyst pellets and being heated by burning of fuel, thereby obtaining a partially steam reformed gas effluent and the hot gas stream of flue gas; passing the effluent from the second reactor to a post reformer; and withdrawing from the post reformer a hot gas stream of product gas rich in hydrogen and carbon monoxide; wherein the steam reforming catalyst comprises nickel and/or noble metal (Fig. 1-3 and C2/L32-C3/L52), but the reference does not explicitly disclose the process wherein the post reformer is an autothermal reformer.

Dybjkær teaches a state or the art process for preparation of hydrogen and carbon monoxide rich gas for production of ammonia and methanol which minimizes steam requirements. Said process comprises passing a process gas of hydrocarbon feedstock through a first reactor, passing effluent from the first reactor to a subsequent tubular reactor and passing the effluent from the second reactor to an autothermal reformer (Fig. 13 and page 101, lines 18-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the post reformer of Rostrop-Nielsen et al. with an autothermal reformer, as taught by Dybjkær, for the purpose of preparing hydrogen and carbon monoxide rich gas for production of ammonia and methanol while minimizing steam production. Doing so would amount to nothing more than a use of a known apparatus for its intended use in a known environment to accomplish entirely expected result.

The applied reference (Rostrop-Nielsen et al. (USP 5,932,141)) has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the

inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1-2 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6 of U.S. Patent No. 5,932,141 in view of Dybjkær ("Tubular Reforming and Autothermal Reforming of Natural Gas - An Overview of Available Processes").

Claims 1-6 of U.S. Patent No. 5,932,141 recite a process for preparation of hydrogen and carbon monoxide rich gas, the process comprising the steps of passing a process gas of hydrocarbon feedstock through a first reactor with a thin film of steam reforming catalyst supported on walls of the reactor in a heat conducting relationship

with a hot gas stream of flue gas; passing effluent from the first reactor to a subsequent tubular reactor being provided with a thin film of steam reforming catalyst and/or steam reforming catalyst pellets and being heated by burning of fuel, thereby obtaining a partially steam reformed gas effluent and the hot gas stream of flue gas; passing the effluent from the second reactor to a fixed bed steam reforming catalyst; and withdrawing from the fixed bed steam reforming catalyst a hot gas stream of product gas rich in hydrogen and carbon monoxide; wherein the steam reforming catalyst comprises nickel and/or noble metal, but they do not explicitly recite the process wherein the fixed bed steam reforming catalyst is a part of an autothermal reformer.

Dybjkær teaches a state or the art process for preparation of hydrogen and carbon monoxide rich gas for production of ammonia and methanol which minimizes steam requirements. Said process comprises passing a process gas of hydrocarbon feedstock through a first reactor, passing effluent from the first reactor to a subsequent tubular reactor and passing the effluent from the second reactor to an autothermal reformer (Fig. 13 and page 101, lines 18-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to pass the effluent from the second reactor to an autothermal reformer in the process recited in claims 1-6 of U.S. Patent No. 5,932,141, as taught by Dybjkær, for the purpose of preparing hydrogen and carbon monoxide rich gas for production of ammonia and methanol while minimizing steam production. Doing so would amount to nothing more than a use of a known apparatus for its intended use in a known environment to accomplish entirely expected result.

Claims 1-2 of the instant application are directed to an invention not patentably

distinct from invention recited in claims 1-6 of U.S. Patent No. 5,932,141, as set forth above.

7. Claims 1-2 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-4 of copending Application No. 09/743,530 in view of in view of Dybjkær ("Tubular Reforming and Autothermal Reforming of Natural Gas - An Overview of Available Processes") and further in view of Igarashi et al. (USP 5,167,865).

Claims 1-4 of copending Application No. 09/743,530 recite a process for preparation of hydrogen and carbon monoxide rich gas, the process comprising the steps of passing a process gas of hydrocarbon feedstock through a first reactor in a heat conducting relationship with a hot gas stream of flue gas; passing effluent from the first reactor to a subsequent tubular reactor being provided with a thin film of steam reforming catalyst and/or steam reforming catalyst pellets and being heated by burning of fuel, thereby obtaining a partially steam reformed gas effluent and the hot gas stream of flue gas; wherein the steam reforming catalyst comprises nickel and/or noble metal, but they do not explicitly recite the process further comprising passing the effluent from the second reactor to an autothermal reformer. Additionally they do not explicitly recite the first reactor having a thin film of steam reforming catalyst supported on walls of the reactor.

Dybjkær teaches a state or the art process for preparation of hydrogen and carbon monoxide rich gas for production of ammonia and methanol which minimizes steam requirements. Said process comprises passing a process gas of hydrocarbon feedstock through a first reactor, passing effluent from the first reactor to a subsequent tubular

reactor and passing the effluent from the second reactor to an autothermal reformer (Fig. 13 and page 101, lines 18-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to pass the effluent from the second reactor to an autothermal reformer in the process recited in claims 1-4 of copending Application No. 09/743,530, as taught by Dybjkær, for the purpose of preparing hydrogen and carbon monoxide rich gas for production of ammonia and methanol while minimizing steam production. Doing so would amount to nothing more than a use of a known apparatus for its intended use in a known environment to accomplish entirely expected result.

With respect to Igarashi et al. the same comments apply as set forth above.

Claims 1-2 of the instant application are directed to an invention not patentably distinct from invention recited in claims 1-4 of copending Application No. 09/743,530, as set forth above.

This is a provisional obviousness-type double patenting rejection.

8. Claims 1-2 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-9 of copending Application No. 10/667,389 in view of in view of Dybjkær ("Tubular Reforming and Autothermal Reforming of Natural Gas - An Overview of Available Processes") and further in view of Igarashi et al. (USP 5,167,865).

Claims 1-9 of copending Application No. 10/667,389 recite a process for preparation of hydrogen and carbon monoxide rich gas, the process comprising the steps of passing a process gas of hydrocarbon feedstock through a first reactor with steam reforming catalyst; passing effluent from the first reactor to a subsequent tubular reactor

being provided with a steam reforming catalyst, thereby obtaining a partially steam reformed gas effluent; passing the effluent from the second reactor to an autothermal reformer; and withdrawing from the autothermal reformer a hot gas stream of product gas rich in hydrogen and carbon monoxide, but they do not explicitly recite the process wherein the steam reforming catalyst comprises nickel and/or noble metal formed as a thin film on reactor wall. Additionally they do not explicitly recite the subsequent reactor being heated by burning fuel to produce a hot gas stream of flue gas, wherein the first reactor is in a heat conducting relationship with a hot gas stream of flue gas.

Dybjkær teaches a state or the art process for preparation of hydrogen and carbon monoxide rich gas for production of ammonia and methanol which minimizes steam requirements. Said process comprises passing a process gas of hydrocarbon feedstock through a first reactor in a heat conducting relationship with a hot gas stream of flue gas; passing effluent from the first reactor to a subsequent tubular reactor being heated by burning of fuel, thereby obtaining a partially steam reformed gas effluent and the hot gas stream of flue gas; and passing the effluent from the second reactor to an autothermal reformer; wherein the steam reforming catalyst comprises nickel and/or noble metal (Fig. 13; page 91, Section 3.2; and page 101, lines 18-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to arrange the first reactor in a heat conducting relationship with the hot gas stream of flue gas and to use catalyst comprising nickel and/or noble metal in the process recited in claims 1-9 of copending Application No. 10/667,389, as taught by Dybjkær, for the purpose of preparing hydrogen and carbon monoxide rich gas for production of ammonia and methanol while minimizing steam production. Doing so

would amount to nothing more than a use of a known apparatus for its intended use in a known environment to accomplish entirely expected result.

With respect to Igarashi et al. the same comments apply as set forth above.

Claims 1-2 of the instant application are directed to an invention not patentably distinct from invention recited in claims 1-9 of copending Application No. 10/667,389, as set forth above.

This is a provisional obviousness-type double patenting rejection.

9. Claims 1-2 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8 of copending Application No. 10/667,392 in view of in view of Dybjkær ("Tubular Reforming and Autothermal Reforming of Natural Gas - An Overview of Available Processes") and further in view of Igarashi et al. (USP 5,167,865).

Claims 1-8 of copending Application No. 10/667,392 recite a process for preparation of hydrogen and carbon monoxide rich gas, the process comprising the steps of passing a process gas of hydrocarbon feedstock through a first reactor with a steam reforming catalyst in a heat conducting relationship with a hot gas stream of flue gas; passing effluent from the first reactor to a subsequent tubular reactor being provided with a steam reforming catalyst and being heated by burning of fuel, thereby obtaining a partially steam reformed gas effluent and the hot gas stream of flue gas, but they do not explicitly recite the process further comprising passing the effluent from the second reactor to an autothermal reformer. Additionally they do not explicitly recite the first reactor having a thin film of steam reforming catalyst comprising nickel and/or noble metal supported as thin film on walls of the reactor.

Dybjkær teaches a state or the art process for preparation of hydrogen and carbon monoxide rich gas for production of ammonia and methanol which minimizes steam requirements. Said process comprises passing a process gas of hydrocarbon feedstock through a first reactor, passing effluent from the first reactor to a subsequent tubular reactor and passing the effluent from the second reactor to an autothermal reformer, wherein the steam reforming catalyst comprises nickel and/or noble metal (Fig. 13; page 91, Section 3.2; and page 101, lines 18-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to pass the effluent from the second reactor to an autothermal reformer and to use steam reforming catalyst comprising nickel and/or noble metal in the process recited in claims 1-8 of copending Application No. 10/667,392, as taught by Dybjkær, for the purpose of preparing hydrogen and carbon monoxide rich gas for production of ammonia and methanol while minimizing steam production. Doing so would amount to nothing more than a use of a known apparatus for its intended use in a known environment to accomplish entirely expected result.

With respect to Igarashi et al. the same comments apply as set forth above.

Claims 1-2 of the instant application are directed to an invention not patentably distinct from invention recited in claims 1-8 of copending Application No. 10/667,392, as set forth above.

This is a provisional obviousness-type double patenting rejection.

10. Claims 1-2 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-7 of copending Application No. 10/668,295 in view of in view of Dybjkær ("Tubular Reforming and

Autothermal Reforming of Natural Gas - An Overview of Available Processes").

Claims 1-7 of copending Application No. 10/668,295 recite a process for preparation of hydrogen and carbon monoxide rich gas, the process comprising the steps of passing a process gas of hydrocarbon feedstock through a first reactor with a thin film of steam reforming catalyst on the reactor wall and in a heat conducting relationship with a hot gas stream of flue gas; passing effluent from the first reactor to a subsequent tubular reactor being provided with a steam reforming catalyst and being heated by burning of fuel, thereby obtaining a partially steam reformed gas effluent and the hot gas stream of flue gas, but they do not explicitly recite the process further comprising passing the effluent from the second reactor to an autothermal reformer. Additionally they do not explicitly recite the steam reforming catalyst comprising nickel and/or noble metal.

Dybjkær teaches a state or the art process for preparation of hydrogen and carbon monoxide rich gas for production of ammonia and methanol which minimizes steam requirements. Said process comprises passing a process gas of hydrocarbon feedstock through a first reactor, passing effluent from the first reactor to a subsequent tubular reactor and passing the effluent from the second reactor to an autothermal reformer, wherein the steam reforming catalyst comprises nickel and/or noble metal (Fig. 13; page 91, Section 3.2; and page 101, lines 18-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to pass the effluent from the second reactor to an autothermal reformer and to use steam reforming catalyst comprising nickel and/or noble metal in the process recited in claims 1-7 of copending Application No. 10/668,295, as taught by Dybjkær, for the purpose of preparing hydrogen and carbon monoxide rich gas for

production of ammonia and methanol while minimizing steam production. Doing so would amount to nothing more than a use of a known apparatus for its intended use in a known environment to accomplish entirely expected result.

Claims 1-2 of the instant application are directed to an invention not patentably distinct from invention recited in claims 1-7 of copending Application No. 10/668,295, as set forth above.

This is a provisional obviousness-type double patenting rejection.

Conclusion

11. In view of the foregoing, none of the claims are allowed.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Basia Ridley, whose telephone number is (571) 272-1453. The examiner can normally be reached on Monday through Thursday, from 9:00 AM to 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola, can be reached on (571) 272-1444.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Technical Center 1700 General Information Telephone No. is (571) 272-1700. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Questions on access to the Private PAIR system should be directed to the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

Basia Ridley
Examiner
Art Unit 1764

BR
March 14, 2004